

DOCUMENT RESUME

ED 251 954

EA 017 363

AUTHOR Poysner, Larry R.
 TITLE An Examination of the Classroom Physical Environment.
 PUB DATE 83
 NOTE 47p.
 PUB TYPE Information Analyses (070) -- Reference Materials - Bibliographies (131)

EDRS PRICE MF01/PC02 Plus Postage.
 DESCRIPTORS Annotated Bibliographies; *Classroom Environment; Classroom Research; Color; Educational Facilities Planning; Elementary Secondary Education; *Facility Requirements; Flexible Facilities; Higher Education; Interior Space; Lighting Design; Noise (Sound); *Physical Environment; School Space; *Student Needs; Student School Relationship

ABSTRACT

The physical environment of the classroom is a web of interrelated and, in many instances, interdependent variables. To examine the effects of the physical environment of the classroom, a total of 45 annotated citations are grouped under the following categories: (1) importance and description of classroom environment; (2) individual factors of lighting and heating, color and noise, seating, and general variables; (3) impact upon students; (4) designing and planning for classroom environments; and (5) creative use of classroom environment. There seems to be general agreement as to the basic affect of spatial arrangement, seating, and general aesthetic appeal of a classroom. Many authors stressed that the environment of a classroom needs to be examined and planned just as any other teaching strategy. Included in the paper are a glossary and a 63-item bibliography. (MLF)

 * Reproductions supplied by EDRS are the best that can be made *
 * from the original document. *

ED251954

AN EXAMINATION OF THE CLASSROOM
PHYSICAL ENVIRONMENT

by

LARRY R. POYSER
Graduate Student

Study Directed

by

Charles R. DuVall, Ph.D.

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

X This document has been reproduced as
received from the person or organization
originating it.
Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official NIE
position or policy.

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

Larry R. Poyser

Poyser

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

Submitted in partial fulfillment of the requirements for
the course S591--Research in Secondary Education
Indiana University at South Bend
Summer, 1983

EA 017 363

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Statement of the Problem	4
Purpose of the Study	4
Organization	4
Limitations	5
Glossary	6
ANNOTATIONS	
Importance and Description of Classroom Environment	9
Individual Factors	12
Lighting and Heating	12
Color and Noise	14
Seating	17
General Variables	19
Impact Upon Students	22
Designing and Planning for Classroom Environment	29
Creative Use of Classroom Environment	31
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	33
Summary	33
Conclusions	36
Recommendations	37
BIBLIOGRAPHY	38

INTRODUCTION

Nearly every year a Gallup Poll reveals what the American public thinks of education. The results have probably provided few surprises to educators, students, or parents. In 1981 the poll listed 25 concerns, most of which have been on the list for nearly all of the 13 polls taken. (Gallup 1981:34-35) It is worth noting that half of the top 16 concerns are a result of or a cause of the lack of proper facilities. Lack of discipline, overcrowding, lack of student interest, and vandalism can not be blamed entirely on the lack of quality classroom environments, but certainly more individuals are becoming increasingly convinced that the classroom physical environment is a factor that indirectly or directly affects many of education's current problems.

Classrooms tend to be boxes which are very much alike, regardless of the age of their occupants, and very resistant to change. (Smith, D. 1971:28) Designers who are responsible for our classroom boxes, no longer can assume that educational programs will be "equally effective in any instructional environment." (Weinstein 1981:17) One reason for this is that classrooms are no longer functioning as single homogenous space cubes. Rather they are networks of interconnected and varied micro-environments. (Sommer 1977:175) Classrooms possess micro-climates which are

BEST COPY AVAILABLE

different from outdoors. After all, "one of the main reasons for having classrooms is to moderate climate conditions in such a way that they become more conducive both to teaching and learning." (Kevan and Howes 1980:321) Architectural characteristics can affect social climate directly or indirectly, through their effect on organizational characteristics, on teacher characteristics, and on student characteristics. (Moos 1980:245) Unfortunately, except for fundamentals of lighting, heating, and ventilation, the relationship between classroom physical designs and human behavior is overlooked. (Weinstein 1979, Weinstein 1980, Loughlin and Suina 1982, Pipes 1981:13, Weinstein 1981:12, Moos 1980)

One easy way to improve the classroom environment is to change our approach when we build a new building. There is a "need for soft buildings that can encourage experimentation or, at least, can accomodate change. Soft buildings will require a new collaboration between designers and the public." (Sommer 1974:138) Within these buildings, student arrangement should be a function of room density, nature of the activity, the instructor's method of teaching, the physical dimensions, and the shape of the room. (Sommer 1965:2) Materials and equipment should be arranged within a work space according "to some guiding principle or principles, such as importance, frequency of use, functional relationships, or sequence of use." (McCormick 1980:355)

The field of sociology should be contributing more to planning improved physical classrooms. They can provide more concise information on the relationship of designs to social goals "as well as to develop the methodology for the evaluation of existing designs. (Korllos 1980:470) Unfortunately the evaluation tools which measure the classroom environment are almost only psychosocial in their emphasis. (Fraser 1981) Teachers possess the intuitive skill to often perceive an environmental problem without a formal evaluative tool, "but lack the skills and confidence to attempt to [act on] them." (Schubert 1980:298)

Recently a number of textbook authors have concluded that the discussion of the physical environment within the classroom should be discussed along with any other context for learning covered in the field of educational psychology. (Good and Brophy 1977, Morris 1978, Knirk 1979, Johnson 1979, Woolfolk and Nicolich 1980) There are two problems that are delaying teacher response to the research findings and conclusions from being utilized within the classroom. First, teachers seemingly are not convinced of the environmental effects within their classroom. Secondly, but possibly more important, is the slowness of communicating the research. In spite of recent condemnations of public schools, "a visit to almost any

school demonstrates that little of the available information has yet to filter down to the classroom." (Rosenfeld 1977:167)

STATEMENT OF THE PROBLEM

The classroom physical environment is being ignored by educators. Teachers, administrators, and even architects are grossly overlooking the impact the classroom environment has on classroom management and students' ability to learn. An examination of those factors which influence the learning environment of children from preschool thru college should be made and communicated to those practicing within the field of education.

PURPOSE OF THE STUDY

It was the purpose of this study to determine the specific elements of the physical environment of the classroom. It was hoped that each factor could be isolated from others and a specific effect ascertained for that one variable. The next step was to determine the effects of the collected variables and their general effects in order to properly describe an environmentally effective classroom.

ORGANIZATION OF THE STUDY

The organization of the annotations as listed in the Table of Contents would suggest that the subject matter was

BEST COPY AVAILABLE

successfully dealt with by examining each specific variable of the classroom environment. This is not the case. Many studies contain several different variables and examined various combinations of effects. If a predominant variable or effect could be identified, it was treated separately. Otherwise, because of the interrelatedness of many variables, they have been treated as a group. Annotations within the subject areas have been organized in the order of their perceived importance.

LIMITATIONS OF THE STUDY

Any attempt to list all possible variables and factors of the physical environment within the classroom would be longer than the scope of this project could handle. Additionally, many factors of the classroom environment have had very little serious scientific study or as also was found to be the case, were either published in a very obscure journal outside the field of education or remained an unpublished report. This study should be considered a broad overview of those studies and discussions that are of most benefit to readers interested in this topic.

BEST COPY AVAILABLE

GLOSSARY

affective domain -- "the area pertaining to the feelings or emotions." (Good 1973:194)

aggressive behavior -- "behavior characterized by vigorous efforts toward self-assertion over others." (Good 1973:58)

behavior -- "the action or activities of an organism." (Good 1973:58)

child behavior -- "a term referring to the actions of the developing individual generally between 2 and 12 years of age." (Good 1973:58)

closure -- "the perceptual need for completion." (Sinofsky 1981:18)

cognitive experience -- "reflective thinking or inquiry that is based on primary experience." (Good 1973:226)

decibel (db(A)) -- the unit for measuring the relative intensities or levels of sounds. Related to a base, the level in decibels describes sound levels specifically, similar to temperature levels in degrees. The decibel refers primarily to sound pressure levels. Because of the hearing characteristics of the ear, it does not necessarily define levels in loudness as heard. (Christie and Glickman 1980:406)

BEST COPY AVAILABLE

educational environment -- "the emotional, physical, and intellectual climate that is set up by the teacher and students to contribute to a wholesome learning situation." (Good 1973:214)

environment -- "a general term designating all the objects, forces, and conditions that affect the individual through such stimuli as he is able to receive."
(Good 1973:214)

footcandle -- "a unit for measuring illumination: it is equal to the amount of direct light thrown by one international candle on a square foot of surface every part of which is one foot away." (Webster 1962:563)

group behavior -- "conduct or reactions of an aggregate."
(Good 1973:59)

group ecology -- "spatial relations in organized groups."
(Sommer 1965:1)

learning environment -- "the setting and conditions that create an atmosphere for learning." (Good 1973:214)

open education -- "a set of teaching practices that reflects the belief that children learn best when they can actively explore an environment rich in materials, when they are given the responsibility to make meaningful choices about what is to be

learned," where rows of desks are replaced with a variety of interest centers where children can work alone or in groups. (Weinstein 1979:577-578)

open space schools -- "a new type of building construction, namely, the absence of interior walls." (Weinstein 1979:578)

prepared environment -- "a triad consisting of the children, their teachers, and their physical surroundings in which a child is motivated, stimulated, and encouraged to choose his own work and execute it to his own satisfaction." (Good 1973:214)

spatial interaction -- "the ways in which built environments, spatial elements, and people interrelate, for example, the effect of furniture arrangement on group behavior and interaction." (Educational Facilities Laboratories 1974:11)

ANNOTATIONS

IMPORTANCE AND DESCRIPTION OF CLASSROOM ENVIRONMENT

Weinstein, Carol S., "Classroom Design as an External Condition for Learning," Educational Technology 21:12-19, August, 1981.

Weinstein stated that individuals who design instruction are concentrating so much attention to methodology that they are overlooking the spatial context in which the educational process takes place. She pointed out that all too often the design of a program and the environment in which it is to occur are in conflict, thereby creating a "setting deprivation." The author made four assumptions about the physical setting of the classroom: (1) The classroom physical setting is an important ingredient within the learning environment. (2) The examination of the classroom environment should take into consideration the social and instructional context. (3) An ideal physical environment that satisfies all learning situations does not exist. (4) The classroom physical environment is an external variable that must be managed as systematically as the other elements of the stimulus situation.

Ryan, William P., "Workshops About the Physical Structure of the Classroom: An Interesting Way to Work With Teachers," Journal of School Psychology 12:242-246, Fall, 1974.

Ryan, a school psychologist, felt that the classroom behavior exhibited by teachers, the spatial arrangement of their classroom furniture, and their choice of interpersonal distancing indicated a lack of awareness on the part of teachers, of how the classroom physical structure affects what occurs within the classroom. He claimed that teachers become so attentive to teaching methodology and other concerns, that the factor of the physical environment becomes ignored. The author developed a workshop that emphasized the necessity of congruence between teacher goals, teaching methods, and the physical structure in which they occur. His workshops provided actual practice in environmental manipulation with small scale model classrooms. Ryan also contended that students should be a part of discussions on how a particular classroom's environment could be improved.

Sullivan, Janet, "Nine Design Factors for Better Learning," Instructional Innovator 26:14-16, March, 1981.

While Sullivan's description of the factors which should be examined to improve learning was intended to be most helpful in designing individual study spaces of a learning resource center, most of the items described were of equal value in discussing the physical setting of the classroom. The author emphasized that human factors engineering has isolated many variables which directly affect a learner's concentration and retention. She stated that the correct physical environment can increase the effectiveness and efficiency of the learner. Sullivan described two methods of reducing the amount of distractions: (1) treating the room with carpeting and ceiling tile to lower the noise level, and (2) designing tabletops so the learner can sit in the work space rather than at it. Sullivan opined that the surface of tables should be reasonably light, "since the contrast of white pages against dark tabletops can cause eye fatigue." (p. 15) The author also indicated that all equipment should be installed in such a way that it is an aid to the learner and not an impediment.

Reddick, Thomas L., "Is Your Classroom Up to Par," Teacher Education 10:27-28, Spring, 1975.

The author developed a checklist of 20 items which were to be graded on a four point scale from very adequate to very inadequate. The checklist contained items to be evaluated ranging from variables describing basic physical conditions such as lighting, ventilation, and acoustics to broad categories, which contained interrelated or overlapping variables, such as "general atmosphere for teaching and learning" and "evidence of creativity on part of teacher." (p. 28) Reddick suggested that some form of environmental evaluation, used periodically, could possibly be as equally valuable as course content or any classroom methodology. Reddick admitted that use of his checklist (or any checklist), will nearly always reveal some items that are beyond the teacher's control, but that resisting the fatalistic attitude and attacking those items that the teacher can control will result in a higher level of professional pride and satisfaction.

Weinstein, Carol S., "Planning the Classroom Environment:
Some Guidelines for Teachers," Humanist Educator
18:186-193, June, 1980.

Weinstein indicated that the physical classroom environment has changed very little since the first graded school buildings were constructed in 1848, a relatively barren box with rows of desks. She stated that while much of the research indicates a questionable relationship between the classroom physical environment and learning, there is little doubt that "the physical environment of the classroom has a very real . . . impact on students' behavior and attitudes." (p. 187) Weinstein claimed environmental studies are important because (1) even improving attitudes and behavior can ultimately result in improved achievement, (2) schools do not exist for academic achievement alone, and (3) the results provide empirical evidence that classroom design can either hinder or assist with the realization of a teacher's instructional goals.

INDIVIDUAL FACTORS

Lighting and Heating

Dorsey, R. T., "How to Get the Most From Your Present Lighting System," American School and University 52:32-33, 34, 36, April, 1980.

Dorsey clarified the fact that providing children with the right amount of light in schools "doesn't necessarily mean flooding the whole school with the same amount of light." (p. 32) Instead, he indicated the importance of providing the correct amount of light for the specific task that students are engaged in. For example, it was calculated that it takes five times as much light to properly light an area where students are sewing as an area in which they are reading. The author also advocated the use of shielded lighting in those areas where any kind of monitor screen is frequently used for computers, video tape, or television viewing. He suggested that the color present in lighting and the amount of light reflected from walls, ceilings, floors and desk tops are important in creating a pleasant atmosphere which reduces contrasts so that students do not tire quickly.

Rudd, Alan, "What to Look For In Classroom Lighting," American School and University 51:45, 48, September, 1978.

Rudd stated that classroom lighting systems "must bring visual comfort to students and instructors." (p. 45) He indicated changes have been made in the methods we use to determine the quality and effectiveness of a lighting system. The author explained that the emphasis has shifted from the quantity of light produced to the quality of light, which in turn put new importance on efforts to reduce ceiling reflections and put light where it is needed. Rudd pointed out that the footcandle is no longer the only method of evaluating lighting but is used with (1) Equivalent Spherical Illuminance (ESI), which is both a quantitative and qualitative measurement that evaluates seeability; (2) Visual Comfort Probability (VCP), which helps measure the quality of light; and (3) Lighting Effectiveness Factor (LEF), which is a ratio of ESI to footcandles. Rudd indicated that achieving good overall seeability would "also reduce eye fatigue and result in a more comfortable work and learning atmosphere." (p. 48)

Canter, David V., and others, Environmental Interaction: Psychological Approaches to our Physical Surroundings, International Universities Press, Inc., New York, 1976, 374 pp.

The authors traced the history of environmental psychology and determined that its foundation was in the basic observable physical conditions such as acoustics, thermal dynamics, the luminous environment, and the spatial environment. Regarding the thermal aspect of a physical setting, the authors stated that "the physical values chosen to describe the environment . . . are air temperature, mean radiant temperature, air velocity, and a measure of humidity." (p. 50) The authors also concluded that while human beings are both very sensitive to and tolerant of irregularities in heating, they "work most efficiently at psychomotor tasks when at comfortable temperatures." (51) The authors stated that in the area of the luminous environment, lighting designers have only been able to avoid luminous disasters, but technology appears to be nearing the point at which designers can produce lit "interiors that are pleasant, satisfying and suited to their purpose." (p. 124)

Scagliotta, Edward G., "Falling Barometer-Failing Behavior," Academic Therapy 15:607-612, May, 1980.

Scagliotta devised a chart to track the daily atmospheric conditions and daily misbehaviors of students. The weather conditions recorded included air pressure, temperature, and humidity. In the study, 127 boys between the ages of nine and thirteen were observed and adverse behaviors were recorded according to a list of five specific types of misbehavior. The author stated "it soon became apparent that with each change in barometric pressure, came an obvious change in the child's behavior." (p. 611) Thus as the article's title suggested, when the barometric pressure went down, the frequency of misbehavior went up. Scagliotta concluded that "by using barometric pressure readings to forewarn a teacher, adequate preparation for dealing with and managing deviant behavior could be established prior to its inception." (p. 612)

Color and Noise

Sinofsky, Esther R., and Knirk, Frederick G., "Choose The Right Color For Your Learning Style," Instructional Innovator 26:17-19, March, 1981.

Sinofsky and Knirk stressed the need for educators to have a "knowledge of environmental psychology to be able to discuss and recommend features that facilitate rather than inhibit, learning." (p. 17) They indicated studies have shown that color influences attitudes, behaviors, and learning. Color affected some individuals differently because of differences in (1) emotional make-up, (2) age, grade, or sex, (3) cultural background, (4) religious biases, and (5) socioeconomic grouping. The most important reasons for using color effectively in the classroom were explained as (1) colors affect on a learner's attention span and (2) colors affect on time sense. The authors indicated that IQ test results have been shown to be affected by children's perception of the test room as being beautiful or ugly in color. The group in the beautiful room scored 12 points above the norm and the ugly group scored 14 points lower than the norm. Sinofsky and Knirk also examined colors affect on (1) closure (the perceptual need for completion), (2) orientation and knowledge, (3) perceptions of spaciousness in a room, and (4) perceptions of room size.

Birren, Faber, Color Psychology and Color Therapy: A Factual Study of the Influence of Color on Human Life, University Books, Inc., New Hyde Park, New York, 1965, 302 pp.

Birren examined color from the historical, biological, psychological, and visual perspective. He indicated that research dealing with color is continuous because it is a matter of combining what is physical and biological with the emotional and psychical. The author concluded that everyday use of color has (1) a centrifugal action - away from the organism to its environment, (2) a centripetal action - away from the environment and toward the organism, (3) to consider, but not be overshadowed by, light intensity and brightness, (4) the strategic ability to calm excited people by matching their spirit, and (5) the ability to excite normally melancholy behavior. Birren dealt with the psychological aspects of color and the variety of specific reactions, such as emotional and associative, that are possible within the psychological realm. The author also explained the historical and cultural reasons for certain color associations.

Papadatos, Steven P., "Color Them Motivated-Color's Psychological Effects on Students," National Association of Secondary School Principals Bulletin, February, 1973.

Papadatos (an architect) stated that in industry, coordinated color selections have increased production from five to ten percent, reduced absenteeism, and helped the morale of the employees. He indicated that in both elementary and secondary education, in spite of research results, "little has been done to create effective coordinated color selections." (p. 92) The author contends that proper use of color in school can convert an atmosphere that is depressing and monotonous into one that is pleasing, exciting, and stimulating. He suggested that such a change in schools would not only reduce absenteeism, as it has in the private sector, but would promote positive feelings about school. Papadatos explained that walls opposite windows should be painted in a light color "that would reflect the sun's rays back to the window wall, which would be painted in a cool medium tone. The front and rear wall should be treated in light tones in order to compensate for the sun's rays." (p. 92) He stated that colors look different in different levels of lighting and various kinds of illumination. He also suggested that painting with a reflective paint may increase the light by one third without remodeling the lighting system.

Bross, Cindy, and Jackson, Karen, "Effects of Room Color on Mirror-Tracing by Junior High School Girls," Perceptual and Motor Skills 52:767-770, June, 1981.

Sixty girls in grades 7, 8, and 9 were tested by Bross and Jackson to determine the effects of preferred and nonpreferred room color on mirror-tracing scores. The authors wanted to investigate whether an interaction between color, muscular tension, and motor performance existed. Each student was given the same questionnaire on two different occasions to determine their preferred color and their nonpreferred color. After practicing mirror-tracing in a neutral colored room, the students were tested in their preferred and nonpreferred colored rooms. Scores were examined by using t tests to measure the effect of extraneous variables such as the effect of order on the subject's performance scores. The errors decreased significantly in the preferred colored room, while the time to complete the test changed minimally. The fact that the subjects made fewer errors in their preferred colored room supported the research that "liked" colors decreased muscular tension within the individual and suggested that room color influences motor performance.

Bronzaft, Arline L., and McCarthy, Dennis P., "The Effect of Elevated Train Noise on Reading Ability," Environment and Behavior 7:517-527, December, 1975.

Bronzaft and McCarthy conducted a study to determine whether elementary students' reading skills were affected by the noise levels in their classrooms. They selected a school in New York City with an elevated subway track running along one side at a distance of 220 feet. Student scores on the Metropolitan Achievement Reading Test for students in second, fourth, and sixth grades on the noisy side of the building were compared with corresponding scores from classes on the quiet side of the building. A questionnaire was also designed to determine students' attitudes toward any source of disturbance. The authors reported that the test comparisons showed that students on the noisy side of the school building lagged from three months to as much as one year behind their peers on the quiet side. The questionnaire results showed that 75% of the children on the noisy side rated their classroom as "noisy" or "very noisy" while 83% of their counterparts on the opposite side of the building considered their room "not very noisy" or "not noisy at all."

Christie, Daniel J., and Glickman, Carl D., "The Effects of Classroom Noise on Children: Evidence for Sex Differences," Psychology in the Schools 17:405-408, 1980.

Christie and Glickman hypothesized that classroom noise would have an effect upon children's intellectual performance. They studied the intellectual performance of 156 first-, third-, and fifth-grade boys and girls who were tested in a noisy environment of 70 db(A) or a reasonably quiet environment of 40 db(A). Testing was done in the school library with one examiner administering the Standard Progressive Matrices to one child. Classroom noise of fourth-grade children was recorded and played back at 70 db(A) to create the noisy environment. An analysis of the data indicated the predicted effect for grade. Also the noise manipulation interacted with sex, showing that males scored higher in a noisy environment than a quiet one and females scored higher in a quiet environment rather than a noisy one. Christie and Glickman had expected to find that the effects of noise would vary with age, but in fact their study showed that the effects of classroom noise did not vary with age. They concluded that "it is likely that children's performance on many classroom tasks will vary as a function of classroom noise levels." (p. 408)

Seating

Sommer, Robert, The Effects of Classroom Environment on Student Learning, Educational Resources Information Center, ED 010 252, University of California, Davis Campus, 1965.

A study was conducted to investigate the effect of different classroom environments upon student participation and interrelationships. Six discussion sections of the same class were assigned to different classroom spaces which they occupied for six weeks before changing rooms with another section. Two rooms had traditional rows and a third room was a laboratory with immoveable seats and tables. One of the rooms was windowless and one had windows along one entire wall. Sommer indicated a statistically significant level of discussion in the laboratory, as far as the percentage of students who took part in discussion, which he hypothesized was caused by the student's inability to sit back and relax in the laboratory room. There was, however, an overall greater amount of discussion in the seminar room. Sommer noted that the major difference between the room with windows and the windowless room was the evidence of escape reactions in the room without windows. The author also concluded that seating position within the classroom made a difference in the level of participation of the individual students.

Stires, Lloyd, "The Effect of Classroom Seating Location on Student Grades and Attitudes: Environment or Self-Selection?" Environment and Behavior 12:241-254, June, 1980.

Stires designed a study of 279 college students who were in two different sections of the same psychology class. One class was a choice condition where students were allowed to select their own permanent seat for the class, whereas the other class was a no-choice situation in which the students were assigned seats in alphabetical order. Data were collected and compared in (1) final grades, (2) randomly selected attendance records, (3) two personality tests, (4) accumulated extra credit points, and (5) an end-of-class evaluation form that measured items from how well the students liked the class to whether they had difficulty in hearing or seeing in class. The study was intended to produce results that supported either the environmental hypothesis or the self-selection hypothesis. Stires reported that except for the variable of accumulated extra credit points, the results overwhelmingly supported the environmental hypothesis, thus supporting the theory that attitudes and grades are affected by seating position.

Koneya, Mele, "Location and Interaction in Row and Column Seating Arrangements," Environment and Behavior 8:265-282, June, 1976.

A study was designed in which 138 students, who were divided into seven sections of the same class, were asked to sit in prearranged circles during the second class meeting, before the class had developed any social structure. The students were assigned a topic for discussion and their verbal contributions were recorded. Later the students were asked to select their preferred seat on a printed diagram depicting a five row by five column seating arrangement to be used in further discussion which was also recorded and analyzed. Student discussion was also recorded when students were randomly seated in the five row by five column arrangement. Koneya indicated the results showed that in both the random seating and student selected seating higher verbal behavior occurred in the triangle of centrality, which is composed of the front row and those seats in the middle rows closest to the front portion of the room.

Becker, Franklin D., and others, "College Classroom Ecology," Sociometry 36:514-525, December, 1973.

The authors investigated the connection between seating arrangement, class size, and student participation. They developed three field studies to assess the amount of student participation in a variety of classes that had different sizes and several kinds of seating arrangements. A further objective of the studies was to determine if students' seating position was a result of their perceived interest and performance in the class. Study I occurred in traditional classrooms with row seating and a lecture format. Study II occurred in laboratory settings with the instructors using a "walk and comment" style. Study III was a questionnaire administered to 282 undergraduate students. The results of Study I indicated that the number of students who participated remained about the same regardless of class size. The results of Study II demonstrated a high level of interaction among all members of the laboratory classes. The results of Study III indicated that a student's seating position was related to (1) performance, (2) students' perception of high and low interest levels, and (3) perceived similarity and liking of the instructor.

Sommer, Robert, "Classroom Ecology," Journal of Applied Behavioral Science 3:489-503, October-November-December, 1967.

Sommer studied the effects of the classroom environment upon student participation. He specifically wanted to determine how participation was influenced by the seating position of the student. His subjects included 144 college students who were assigned to six different discussion groups, each of which contained approximately 24 students. Two of the classes met in two different seminar rooms and two of the classes met in a laboratory room especially chosen because of its fixed seating arrangement. These four classes switched rooms in the middle of the course. The last two groups met in conventional classrooms, one of which had windows and the other did not. These two classes switched rooms with each other in the middle of the semester. The ecology of participation was charted for each room. Sommer reported that "the results have shown clearly that there is a relationship between classroom seating and participation." (p. 499)

General Variables

Weinstein, Carol S., "Modifying Student Behavior in an Open Classroom Through Changes in the Physical Design," American Educational Research Journal 14:249-262, Summer, 1977.

The author observed the behavior of second and third graders in an open classroom before and after changes were made in the physical design of the room. Student activities and their locations were charted on a floor plan of the classroom for a period of two weeks prior to the changes being made. This data was examined with the teacher and a number of behavior patterns which were not congruent with the teacher's expectations and goals were identified. One major concern was the apparent crowding of certain work areas while several other areas of the room went unused. Design changes were then planned that would (1) increase the use of areas that had been identified as underused, (2) increase each area's ability to be used in a wider variety of activities, and (3) to assist with the use of manipulative materials. Weinstein noted that the observations conducted during a two-week postchange period demonstrated the effectiveness of the design changes in producing the desired behavioral changes. The author stated that the effectiveness was particularly impressive because the verbal exhortations by the teacher had failed to produce any of the desired behavioral changes.

Zifferblatt, Steven M., "Architecture and Human Behavior: Toward Increasing Understanding of a Functional Relationship," Educational Technology 12:54-57, August, 1972.

Zifferblatt reported behavioral differences in observational comparisons of two third-grade, open-education classes which the instructional objectives and methodologies were very nearly the same. In one classroom, he observed a large amount of unnecessary movement and considerable unneeded conversation along with obviously shorter attention spans. In this classroom the desks were clustered in large groups with as many as 12 in one group. The teacher in this room was not clear in designating specific areas for different activities and her behavior was described as passive, probably resulting partially from having her desk in a somewhat centrally located position. In the more satisfactory classroom, the desks were arranged in groups of twos and threes, causing the students to work in much smaller groups. In this room the teacher's desk was located in a corner, which resulted in the teacher moving around the room to direct activities. Zifferblatt concluded that the behavioral differences were the result of different spatial arrangements.

Rosenfeld, Lawrence, B., "Setting the Stage for Learning," Theory Into Practice 16:167-173, June, 1977.

Rosenfeld made a comparison between the physical aspects of the theatre stage and the classroom. He viewed the classroom as being a stage composed of a set, color, lighting, music, heating, costumes, and body types. Within the confines of the comparison, Rosenfeld summarized many of the studies that have dealt with spacing in the classroom, seating arrangements, and student preferences for esthetically pleasing rooms. Several studies were also referred to that described the psychological effects of several different uses of color, lighting, music, and heating. The author also provided rationale for teachers not to overlook the effect that clothing and body type have upon the climate that is established within the classroom. Rosenfeld concluded that the classroom environment needs (1) to provide a variety of stimuli, (2) to present a secure, comfortable feeling, (3) to be adapted to the specific activity, and (4) to allow for a degree of individuality. For teachers to accomplish this, the author suggested that the multitude of variables need to be treated as highly interdependent.

Engel, Brenda S., Arranging The Informal Classroom, Educational Development Center, Inc., Newton, Mass., 1973, 112 pp.

Engel provided a variety of ways for dealing with a number of different physical variables in the classroom. She listed an extensive number of ways that the teacher (primarily elementary teachers) can augment, alter, and deal with such physical aspects as the ceiling, walls, and floors, in such a way as to strengthen the environment for an improved learning climate. Engel stated that "most classrooms are, in fact, dreary at best. Nobody much cares about them, neither teachers nor children. A centrally important aspect of the educational process is not only left out but is actually undermined." (p. 80) The author indicated that classrooms that contain furniture and equipment that are homemade (or in upper elementary and junior high grades, "classmade"), improvised, or collected establishes a climate that is unlike the next room down the hall, and one that bears the mark of a particular teacher and a particular group of students. Above all, in furnishing a classroom, Engel expressed the opinion that the main considerations should be ones that are "directly relevant to the children as main users of the room." (p. 80)

IMPACT UPON STUDENTS

Maslow, A. H., and Mintz, N. L., "Effects of Three Esthetic Conditions Upon Perceiving 'Energy' and 'Well-Being' in Faces," Journal of Psychology 41:247-254, 1956.

The authors conducted a study of the effects of esthetic surroundings upon people. They arranged the environments of three rooms so that the rooms were justly referred to as "beautiful," "average," and "ugly." Maslow and Mintz used 42 male and female undergraduate students as subjects who were told the experiment dealt with facial stereotyping. Each subject was shown 10 negative-print photographs within one of the especially arranged room environments and rated each picture, using a six-point rating scale. The results indicated that the subjects in the beautiful room gave significantly higher ratings than the subjects who were tested in either the average or ugly rooms. The authors revealed that the mean rating given by the subjects in the beautiful room was in the range defined as "energy" and "well-being," while the mean of the ratings given by subjects in both the average and ugly rooms was in the range defined as "fatigued" and "displeased."

Proshansky, Etta, and Wolfe, Maxine, "The Physical Setting and Open Education," School Review 82:557-574, August, 1974.

Proshansky and Wolfe clarified the difference between open-space schools, which are buildings that are designed and constructed without a proliferation of interior walls, and open space education, which is a philosophy of education that advocates the simultaneous use of multiple centers of learning by small groups of students attending to multiple activities. The authors stated that while four physical walls encompassing a class of students does not preclude open education, it is as much a contradiction between philosophy and design as are rows and columns of seats in an open-space school building. They stressed that the relationship between a philosophy of education and the physical setting in which the philosophy is implemented continues to be a critical issue. The authors agreed that a philosophy and a physical setting should be in agreement. Proshansky and Wolfe described two major ways that the arrangement of furniture and space indicate educational goals: (1) Physical and spatial factors of a classroom environment are symbolic messages of what the teacher expects to occur within the setting. (2) Physical and spatial aspects of a classroom constitute a pragmatic role in the educational setting.

Mintz, N. L., "Effects of Esthetic Surroundings: II. Prolonged and Repeated Experience in a 'Beautiful' and an 'Ugly' Room," Journal of Psychology 41:459-466, 1956.

The author described a study that was conducted simultaneously and parallel with the experiment that was described by Maslow and Mintz. The subjects in this study were the two examiners, a male and a female undergraduate student, who did not know any more than their subjects did concerning the actual intent of the experiment. The examiners also believed the study concerned facial stereotyping. These subjects alternated between the "beautiful" and "ugly" room so that each subject spent three sessions in each of the two rooms. The two examiners used the same rating scale as the subjects of the original study, which was completed not only before and after the original study, but at the beginning and end of each session in which they served as the examiner. The results indicated that the examiners had short-term effects similar to those reported by the subjects. The authors' observational notes showed that the examiners had reactions of "monotony, fatigue, headache, sleep, discontent, irritability, hostility, and avoidance" (p. 466) when they were in the ugly room. When the examiners were in the beautiful room they had feelings of "comfort, pleasure, enjoyment, importance, energy, and a desire to continue their activity." (p. 465)

Sommer, Robert, and Olsen, Helge, "The Soft Classroom," Environment and Behavior 12:3-16, March, 1980.

The authors described their efforts to develop a more humanizing classroom that would be an alternative to most existing classroom decors and layouts. They then monitored its use in terms of classroom interaction and satisfaction of the users. The remodeled room consisted of three-tiered cushioned benches (instead of previously used rows of desks with writing panels), carpeting, adjustable lighting, and a variety of decorative items. Observations indicated that student participation levels were two or three times higher than similar classes held in conventional type classrooms on the same campus. Voluntary participation, in particular, was improved with 79% of the students in the "soft" classroom participating voluntarily compared with 51% in traditional classrooms. The rating of the room by students as excellent changed from 7% before the room modifications to 85%, 58%, and 82% following renovation.

Kritchevsky, Sybil, and Prescott, Elizabeth, Planning Environments for Young Children: Physical Space, National Association for the Education of Young Children, Washington, D. C., 1969.

Kritchevsky and Prescott built their ideas upon the premise that a relationship exists between space and the resultant behavior of those who interact within the space. The authors believed that spatial cues are important and that "particular settings invite children to involve themselves in particular activities, and the extent of children's constructive participation in the activity will depend in large part on how well certain concrete, measurable aspects of the surrounding physical space meet their 'hunger, attitudes, and interests.'" (p. 4) Kritchevsky and Prescott stated that when the quality of spatial usage is lacking, children were less inclined to be involved and interested in instructional activities while teachers by contrast were more inclined to teach in an insensitive manner.

Tognoli, J., "The Effects of Windowless Rooms and Unembellished Surroundings on Attitudes and Retention," Environment and Behavior 5:191-201, June, 1973.

This study dealt with how different settings alter students' behaviors in terms of attitude and retention. Tognoli designed the study to measure the effect of three independent variables upon retention and an attitude scale to judge interestingness, comfortableness, distractingness, and pleasantness. The three variables were (1) type of chair (wooden oak versus upholstered seat and back), (2) presence of a window, and (3) room embellishment (plain versus one with colored drawings and a carpet). The study was conducted on fifty-six male and female undergraduate students ranging from 17 to 21 years of age. The students were placed in eight groups, one for each of the different combinations of the three variables, and asked to individually view a ten minute videotape, followed by a ten-item questionnaire measuring retention and the four item attitude opinionnaire. Tognoli found that (1) students rated the embellished room more interesting, (2) the room with windows and embellished was more pleasant, (3) comfortableness was a three-way interaction between type of chair, presence of a window, and embellishment, and (4) that conditions most conducive to retention "arise from a perceptual synthesis of certain variations of these conditions." (p. 199)

Walberg, Herbert J., "Physical and Psychological Distance in the Classroom," School Review 77:64-70, March, 1969.

The purpose of Walberg's study was to examine the hypothetical relationship between seating position and student personality. The sample included 486 boys and 331 girls who were juniors and seniors enrolled in Harvard Project Physics, an experimental high school science course. Students were given the Biographical Inventory, which contained 300 multiple-option questions regarding attitudes, interests, personality, family background, and so forth. One of the items identified a preferred seating position and was compared to the remaining 299 items. Walberg reported distinct characterizations based upon the selection of any one of the five choices for preferred seating. Walberg concluded that "many of the results reported here support a hypothesis equating physical and psychological distance." (p. 69)

Howell, Robert G., Jr., and Howell, Patricia L., Discipline in the Classroom: Solving the Teaching Puzzle, Reston Publishing Company, Inc., Reston, Va., 1979, 221 pp.

Howell and Howell suggested the need for teachers to analyze a list of 10 variables before beginning long-term instructional planning: (1) size of work space and possible usage, (2) shape of work space, (3) seating arrangement, (4) furniture arrangement, (5) windows and lighting, (6) carpeting, (7) heating and air-conditioning, (8) usage of chalkboards and bulletin boards, (9) storage space, and (10) classroom cleanliness. (p. 39) The authors felt that a particular teacher's treatment of environmental variables would vary with the characteristics of a particular teaching assignment. They stressed the importance of considering "how aspects of the physical environment may interfere with learning and contribute to student misbehavior and resultant disciplinary problems." (p. 38) Howell and Howell advocated the use of analysis of the physical characteristics of the classroom environment as a preventative disciplinary strategy.

Sommer, Robert, and Becker, Franklin D., "Room Density and User Satisfaction," Environment and Behavior 3:412-417, December, 1971.

Sommer and Becker investigated the usage of a college classroom over a four year period, which involved 422 students enrolled in 32 separate classes. The classroom contained 22 chairs with attached arm tops for writing and classes had a mean size of 13. All students and most of the instructors completed a rating scale concerning all aspects of the room environment. Each item on the rating scale contained four graded responses. The results indicated a Pearson product-moment correlation between class size and dissatisfaction with the environment of the room of .36. The authors stated that "our results make clear psychologists must deal with organisms-in-environments rather than look at organisms or environments. (p. 416)

Horowitz, Peter, and Otto, David, The Teaching Effectiveness of an Alternative Teaching Facility, Educational Resources Information Center, ED 083242, University of Alberta, Alberta, Canada, 1973.

The authors studied both the behavior and the academic performance of college students in a traditional classroom compared with a specially designed room. The special room contained (among other features): carpeting; moveable panels; liberal use of color; flexible, comfortable seating; and variable lighting. The two classes were identical as far as course content, instructor, teaching style, tests, and assignments. Comparisons of grades on the final examination and two term papers failed to reveal any differences in learning between the two groups. However, there were noticeable differences in the behavior of the two groups. Attendance of the students in the experimental room was better even though they met at a less convenient time (8:00 a.m.). The students in the experimental room also (1) had more interaction, (2) paid more visits to the instructor's office, and (3) exhibited greater informality and group cohesion.

Romney, Bryan Miles, The Effects of Windowless Classrooms on the Cognitive and Affective Behavior of Elementary School Students, Educational Resources Information Center, ED 126 622, Master's Thesis, University of New Mexico, 1975, 53 pp.

The author designed a study to measure the effect of windowless classrooms on rote learning, concept formation, and perceptual ability. In addition to measuring the impact upon these cognitive behaviors, Romney wanted to observe student and teacher affective behavior. He used two sixth grade classes for the study, in which each class was randomly divided into three groups and given a task in one of the three cognitive areas. Each class spent half of the six week experimental period in a room with the windows covered. Following the study, Romney concluded that the "students were significantly affected by their environment, but no clear relationships could be drawn" (p. 4) regarding the cognitive behaviors because the classes responded to the windowless environment in the opposite manner from each other and each task group within each class responded differently. In the area of affective behavior, however, Romney found the windowless environment to be a definite negative factor in causing student aggression and teacher frustration.

Weinstein, Carol S., and Woolfolk, Anita E., "Classroom Design and Impression Formation: A New Area for Research," Contemporary Educational Psychology 6:383-386, October, 1981.

Weinstein and Woolfolk described how individuals use the environment as a source of information. The authors developed a slide presentation that depicted different elementary school rooms which varied in the type of furniture arrangement used (open versus traditional) and condition of the room (neat or messy). Several classes of each possible combination of the two variables were photographed, with the pictures being taken in such a way that the viewer would see four different views (projected simultaneously on side by side screens) and create the simulation of walking into the room. Two groups of college students and one group of fifth grade students were shown the slides and then asked to complete a high-inference scale. The authors reported that all three groups agreed as to the effect of room condition; teachers and pupils in neat classrooms were judged much more favorably than those in the messy rooms. As to room arrangement, the college students described the open room in positive terms, while the fifth graders ascribed no impact to furniture arrangement.

Nash, B. C., "The Effects of Classroom Spatial Organization on Four- and Five-Year Old Children's Learning," British Journal of Educational Psychology 51:144-155, June, 1981.

Nash described a three-year cumulative study in which 500 four- and five-year-olds in 38 classrooms were observed. Half of the classrooms were randomly arranged and half were classrooms in which space was deliberately arranged to promote learning. The equipment, materials, scheduling of activities, and teacher-student communication patterns were very nearly the same for all classrooms observed. The author concluded that from the students' perspective, the classroom's spatial organization spells out the teacher's expectations of student behavior and that part of a teacher's classroom strategy should be spatial planning. Nash said his "investigation strongly suggests that the arrangement of classroom space can enhance or reduce specific learning outcomes." (p. 154)

Gifford, Robert, "Environmental Numbness in the Classroom," Journal of Experimental Education 44:4-7, Spring, 1976.

The author investigated student behavior in a classroom where the furniture was intentionally placed in such a fashion that it impeded student movement around the room, while the classroom activity required such movement. Gifford observed 34 psychology students who each had to move throughout the room a minimum of seven times during the class meeting between furniture that was positioned 6 to 7 inches apart. The furniture was both light weight and moveable, so that the students were faced with a choice of squeezing through slight passages or moving the piece of furniture that blocked the path. With a minimum of 238 passages observed, over 97% of the time the furniture was not moved. Gifford stated that while the reason why students adjust to furniture rather than moving an impediment is not clear, the data suggests quite strongly that students will repeatedly accept impediments within the classroom physical environment.

DESIGNING AND PLANNING FOR CLASSROOM ENVIRONMENTS

Pipes, Lana, "Designing Facilities as if People Mattered,"
Instructional Innovator 26:12-13, March, 1981.

Pipes explained that ergonomics, biotechnology, and human factors engineering all deal with studies of the relationships between humans and the environment that they inhabit. She stated that as these relationships are better understood, they are having an impact upon the design of furniture and the color of rooms. The author pointed out that these changes serve three purposes: (1) "to decrease wasted motion and to increase efficiency, accuracy, or speed of performance" (p. 13); (2) to eliminate distractions that were caused by a poor physical environment; and (3) to improve overall esthetics and thus achieve improved attitudes. Pipes challenged the educational leaders to attain what industrial personnel have - the design of work spaces that place an economy on movement and a premium upon attention to task. The author concluded that "educational technology, whose basic tenets stress a systems approach to learning that melds concerns for technology and people in the design of instructional processes, is the natural advocate of this young discipline." (p. 13)

Leu, Donald J., Planning Educational Facilities, The Center for Applied Research in Education, Inc., New York, 1967, 115 pp.

Leu identified 17 different major educational concepts and indicated that they must be dealt with in one of three ways: (1) by rejecting or ignoring the new concept, (2) by inclusion of the concept in future planning of physical space, or (3) by designing physical environments in such a manner that they may be modified to allow implementation of a new concept at some future time. The author found that it is of increasing importance to construct school buildings that are compatible to the ages, interests, and behavioral traits of children. He indicated a new focus on the differentiation of students' spatial needs is gradually relaxing the rigidity and stiffness of older classrooms. Leu concluded that "many architects are attempting to design a physical environment that will not only contribute to existing theories of learning, but also assimilate educational changes." (p. 5)

Castaldi, Basil, Creative Planning of Educational Facilities, Rand McNally and Co., Chicago, 1969, 364 pp.

Castaldi outlined the methods used by designers in planning educational facilities at all levels. The author separated the educational building types when he described the step-by-step process utilized in planning any educational plant. He examined a wide variety of educational, psychological foundations along with the corresponding implications for achieving a compatible design function. Castaldi listed concepts that he envisioned may occur in school planning that would necessitate corresponding changes in design, such as variable group-size teaching, multi-structured scheduling, the school-within-a-school concept, and the self-instructional concept. The key principle that Castaldi stressed throughout was flexibility of design. The author indicated that one of the ways that environments of elementary schools in the future will be different is in the inclusion of types of spaces that are not now found in most elementary school settings, such as seminar rooms, teacher offices, and small project construction shops.

Sommer, Robert, "Classroom Layout," Theory Into Practice 16:174-175, June, 1977.

Sommer claimed that while the physical environment is only one variable among many that affects learning, it is too important a factor to be completely disregarded. He indicated that teachers should be able to rationally defend their arrangement of tables, chairs, and desks according to specific, predetermined educational goals. The author contended that the physical layout of the classroom is highly reflective of a teacher's attitudes and philosophies. He indicated that he believes it is not possible for the relationship between the teacher and students to be unaffected by straight, immoveable rows of chairs and desks or conversely by clusters of moveable chairs and tables. Sommer stressed that "the physical and the social systems of the classroom are inextricably twined. Change one and you inevitably change the other." (p. 175)

CREATIVE USE OF CLASSROOM ENVIRONMENT

Loughlin, Catherine E., and Suina, Joseph H., The Learning Environment: An Instructional Strategy, Teachers College Press, New York, 1982, 249 pp.

Loughlin and Suina defined the learning environment as consisting of the architectural facility (containing the basic physical conditions of light, sound, temperature, and room size and shape) and the arranged environment (containing a variety of classroom furniture and interest centers). They stressed that "the arranged environment can be used as an instructional strategy, complementing and reinforcing other strategies the teacher uses to support children's learning." (p. 5) The authors indicated that when teachers arrange the active and responsive elements of the learning environment, the environment becomes a tool which (1) teaches, (2) predicts behavior, and (3) manages tasks. Loughlin and Suina explained that the teacher has four areas to master for the environment to be arranged for learning: spatial organization, provisioning for learning, materials arrangement, and organizing for special purposes. They maintained that the learning environment influences behavior by (1) urging movement, (2) either calling or not calling attention to learning materials, (3) encouraging either shallow or deep involvement, and (4) inviting children to move slowly or quickly.

Forte, Imogene, and Mackenzie, Joy, Nooks, Crannies, and Corners: Learning Centers for Creative Classrooms, Incentive Publications, Inc., Nashville, 1972, 189 pp.

Forte and Mackenzie were interested in establishing learning centers. The authors indicated that one key to the construction of learning centers in a school or classroom was the maximum awareness and utilization of the physical environment. Likewise they contended that for any teacher to make creative use of the environment meant strong consideration of utilizing some type of learning center. Forte and Mackenzie generalized that students are influenced by their surroundings in either a positive or negative direction and that "a cheerful, well-lighted, comfortably ventilated classroom encourages 'good feelings' about school and consequently, the development of a healthy emotional set toward learning." (p. 105) The authors dispelled the idea that the age of a particular building or a style of construction might limit the possibilities of using the physical environment to achieve creative teaching.

Greabell, Leon C., and Forseth, Sonia D., "Creating A Stimulating Environment," Kappa Delta Pi Record 17:70-72, 75, February, 1981.

Greabell and Forseth gave a description of two entirely different ways of physically organizing a classroom for the beginning of a new school year. The first classroom was a traditional approach with the desks and chairs arranged in neat rows with the teacher's desk centered in the front of the room directly facing the students' desks. Printed cards with the alphabet and a number line were tacked above the chalkboard and premade posters were put on a bulletin board. This was contrasted with the second classroom, in which the desks and chairs were arranged in clusters throughout the room, different kinds of informal learning centers were set up around the room, and the teacher's desk was turned sideways and pushed against a wall so that it acted as a divider in helping to create a tiny quiet area for students. These descriptions provided by the authors illustrated their opinion that "a stimulating environment, rich with color, relaxed in mood, and imaginative in arrangement" (p. 71) create a positive, encouraging climate that will stimulate students. The authors contended that a stimulating environment provides more opportunities to (1) observe a child's interests, (2) evaluate the child in terms of individual academic curriculum needs, and (3) have a creative outlet for himself/herself.

SUMMARY

Weinstein pointed out that the spatial context where education occurs is being overlooked. It was conceded that the perfect classroom environment does not exist. Ryan believed the spatial arrangements observed in classrooms indicated a lack of awareness on the part of teachers as to the importance of the physical setting. One way to increase the awareness of teachers is to encourage them to evaluate their classroom's environment. Reddick developed a checklist to accomplish this type of activity. Weinstein concluded that classrooms have changed very little from their original box shape.

Dorsey provided a comparison of the different lighting levels needed by various kinds of activities, while Rudd explained how light is measured to provide teachers and students with comfortable, adequate lighting. The thermal environment was discussed by Canter, who indicated that the major subvariables of heat are temperature, radiant temperature, wind, and humidity. After charting weather changes, Scagliotta concluded that misbehavior occurs more frequently when air pressure goes down.

Birren discussed the complex relationship between color and personality. While general effects of a particular color can be found, individuals still can react

differently from the norm. Sinofsky and Knirk decided that color's best attribute is the ability to beautify a room which they found to have positive impact upon I.Q. scores. Papadatos emphasized the importance of coordinating colors to produce certain desired effects, while the tests by Bross and Jackson indicated that colors that were liked influenced the muscular tension and motor control of students.

The study by Bronzaft and McCarthy indicated that New York City students were hampered in their reading skills by elevated train noise. Christie and Glickman determined that the effect of noise upon students does not vary with age.

Sommer found that the level of participation was influenced by seating position, while Stires proved that grades and attitudes are also affected by seating location. Koneya was able to locate and name the area of seating which affects behaviors most as the triangle of centrality. Becker studied seating positions in various types of classrooms and also found that seating position was related to student performance.

Zifferblatt observed that how space is used within the classroom resulted in behavioral differences. The behavioral results of any variable were acknowledged by Rosenfeld, who stressed the need to understand that all the physical variables are highly interdependent.

Maslow and Mintz performed an often quoted study that determined the effect upon individuals of a beautiful versus an ugly room, while Sommer believed that a beautiful room also had to be "soft". Tognoli discovered certain effects of windowless rooms. Horowitz and Otto redesigned a room without windows in such a fashion that their experimental room improved attitudes. Nash found specific positive results of spatial planning, while Gifford noted that the spatial effect of arranging furniture can be numbness on the part of students.

Loughlin and Suina concluded that the arranged environment can be utilized as an instructional strategy. For this to occur, however, Forte and McKinzie stressed the need to be creative and imaginative in your use of the classroom environment.

BEST COPY AVAILABLE

CONCLUSIONS

The physical environment of the classroom is a web of micro-variables, which are highly interrelated and in many instances interdependent. Each factor of the classroom environment can and should be examined independently. In certain fundamental areas, such as temperature and lighting, this might mean laboratory studies rather than classroom investigations, because of the need to tightly control the variables. There appears to be a variety of opinions in some fundamental areas as to preferred levels.

There does seem to be general agreement as to the basic affect of spatial arrangement, seating, and general esthetic appeal of a classroom. Most instances where slight differences were reported in results were no doubt due to differences between the studies and the methodology used.

Another large area of agreement is the opinion of many authors and researchers that teachers are indeed overlooking the importance of the classroom environment. Many authors stressed that the environment of a classroom needs to be examined and planned just as any other teaching strategy.

BEST COPY AVAILABLE

RECOMMENDATIONS

It is recommended that:

1. Instructors teaching educational psychology courses at both the undergraduate and graduate levels strongly consider textbooks that include material dealing with the classroom physical environment.
2. The topic of using the classroom environment be included among those considered for in-service workshops sponsored by school systems and centers of higher education.
3. Individual teachers be encouraged to use some means of evaluating the environmental factor of their classroom before school starts and periodically during the school year.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Becker, Franklin D., and others, "College Classroom Ecology," Sociometry 36:514-525, December, 1973. (18, 34)
- Birren, Faber, Color Psychology and Color Therapy: A Factual Study of the Influence of Color on Human Life, University Books, Inc., New Hyde Park, New York, 1965, 302 pp. (14, 33)
- Bronzaft, Arline L., and McCarthy, Dennis P., "The Effect of Elevated Train Noise on Reading Ability," Environment and Behavior 7:517-527, December, 1975. (16, 34)
- Bross, Cindy, and Jackson, Karen, "Effects of Room Color on Mirror-Tracing by Junior High School Girls," Perceptual and Motor Skills 52:767-770, June, 1981. (15, 34)
- Canter, David V., and others, Environmental Interactions: Psychological Approaches to our Physical Surroundings, International Universities Press, Inc., New York, 1976, 374 pp. (13, 33)
- Castaldi, Basil, Creative Planning of Educational Facilities, Rand McNally and Co., Chicago, 1969, 364 pp. (30)
- Christie, Daniel J., and Glickman, Carl D., "The Effects of Classroom Noise on Children: Evidence for Sex Differences," Psychology in the Schools 17:405-408, 1980. (6, 16, 34)
- Dorsey, R. T., "How to Get the Most From Your Present Lighting System," American School and University 52:32-33, 34, 36, April, 1980. (12, 33)
- Educational Facilities Laboratories, Learning About the Built Environment, A Report from Educational Facilities Laboratories and the National Association of Elementary School Principals, Educational Facilities Laboratories, New York, 1974, 88 pp. (8)
- Engel, Brenda S., Arranging The Informal Classroom, Educational Development Center, Inc., Newton, Mass., 1973, 112 pp. (21)

- Fraser, Barry J., "Using Environmental Assessments to Make Better Classrooms," Journal of Curriculum Studies 13:131-144, April-June, 1981. (3)
- Forte, Imogene, and Mackenzie, Joy, Nooks, Crannies, and Corners: Learning Centers for Creative Classrooms, Incentive Publications, Inc., Nashville, 1972, 189 pp. (31, 35)
- Gallup, George, "The Thirteenth Annual Gallup Poll of the Public's Attitudes Toward the Public Schools" Phi Delta Kappan 63:33-47, September, 1981. (1)
- Gifford, Robert, "Environmental Numbness in the Classroom," Journal of Experimental Education 44:4-7, Spring, 1976. (28, 35)
- Good, Carter V., Editor, Dictionary of Education, 3rd edition, McGraw-Hill Book Co., New York, 1973, 681 pp. (6, 7)
- Good, Thomas L., and Brophy, Jere E., Educational Psychology: A Realistic Approach, Holt, Rinehart, and Winston, New York, 1977, 590 pp. (3)
- Greabell, Leon C., and Forseth, Sonia D., "Creating A Stimulating Environment," Kappa Delta Pi Record 17:70-72, 75, February, 1981. (32)
- Horowitz, Peter, and Otto, David, The Teaching Effectiveness of an Alternative Teaching Facility, Educational Resources Information Center, ED 083242, University of Alberta, Alberta, Canada, 1973. (26, 35)
- Howell, Robert G., Jr., and Howell, Patricia L., Discipline in the Classroom: Solving the Teaching Puzzle, Reston Publishing Company, Inc., Reston, Va., 1979, 221 pp. (25)
- Johnson, David W., Educational Psychology, Prentice-Hall, Englewood Cliffs, N.J., 1979, 592 pp. (3)
- Kevan, Simon M., and Howes, John D., "Climatic Conditions in Classrooms," Educational Review 32:281-292, November, 1980. (2)
- Knirk, Frederick G., Designing Productive Learning Environments, Educational Technology Publications, Englewood Cliffs, N.J., 1979, 171 pp. (3)

- Koneya, Mele, "Location and Interaction in Row and Column Seating Arrangements," Environment and Behavior 8:265-282, June, 1976. (18, 34)
- Korllos, Thomas S., "Sociology of Architecture: An Emerging Perspective," Ekistics 47:470-475, November-December, 1980. (3)
- Kritchevsky, Sybil, and Prescott, Elizabeth, Planning Environments for Young Children: Physical Space, National Association for the Education of Young Children, Washington, D. C., 1969. (24)
- Leu, Donald J., Planning Educational Facilities, The Center for Applied Research in Education, Inc., New York, 1967, 115 pp. (29)
- Loughlin, Catherine E., and Suina, Joseph H., The Learning Environment: An Instructional Strategy, Teachers College Press, New York, 1982, 249 pp. (2, 31, 35)
- Maslow, A. H., and Mintz, N. L., "Effects of Esthetic Conditions Upon Perceiving 'Energy' and 'Well-Being' in Faces," Journal of Psychology 41:247-254, 1956. (22, 35)
- McCormick, Ernest J., and Ilgen, Daniel, Industrial Psychology, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1980, 464 pp. (3)
- Mintz, N. L., "Effects of Esthetic Surroundings: II. Prolonged and Repeated Experience in a 'Beautiful' and 'Ugly' Room," Journal of Psychology 41:459-466, 1956. (23)
- Moos, Rudolf H., "Evaluating Classroom Learning Environments," Studies in Educational Evaluation 6:239-252, 1980. (2)
- Morris, Joseph, Psychology and Teaching: A Humanistic View, Random House, New York, 1978, 493 pp. (3)
- Nash, B. C., "The Effects of Classroom Spatial Organization on Four-and Five-Year Old Children's Learning," British Journal of Educational Psychology 51:144-155, June, 1981. (28, 35)

- Papadatos, Steven P., "Color Them Motivated-Color's Psychological Effects on Students," National Association of Secondary School Principals Bulletin, February, 1973. (15, 34)
- Pipes, Lana, "Designing Facilities as if People Mattered," Instructional Innovator 26:12-13, March, 1981. (2, 29)
- Proshansky, Etta, and Wolfe, Maxine, "The Physical Setting and Open Education," School Review 82:557-574, August, 1974. (22)
- Reddick, Thomas L., "Is Your Classroom Up to Par?" Teacher Education 10:27-28, Spring, 1975. (10, 33)
- Romney, Bryan Miles, The Effects of Windowless Classrooms on the Cognitive and Affective Behavior of Elementary School Students, Educational Resources Information Center, ED 126 622, Master's Thesis, University of New Mexico, 1975, 53 pp. (27)
- Rosenfeld, Lawrence, B., "Setting the Stage for Learning," Theory Into Practice 16:167-173, June, 1977. (4, 20, 34)
- Ruud, Alan, "What to Look For In Classroom Lighting," American School and University 51:45, 48, September, 1978. (12, 33)
- Ryan, William P., "Workshops About the Physical Structure of the Classroom: An Interesting Way to Work With Teachers," Journal of School Psychology 12:242-246, Fall, 1974. (9, 33)
- Scagliotta, Edward G., "Falling Barometer-Failing Behavior," Academic Therapy 15:607-612, May, 1980. (13, 33)
- Schubert, William H., "Educating Teachers To Evaluate Learning Environments," Studies in Educational Evaluation 6:297-300, 1980. (3)
- Sinofsky, Esther R., and Knirk, Frederick G., "Choose The Right Color For Your Learning Style," Instructional Innovator 26:17-19, March, 1981. (6, 14, 34)
- Smith, Dan, "On The Classroom Box," in Farallones Scrapbook, pp. 28-32, Random House, Inc., New York, 1972. (1)

Sommer, Robert, The Effects of Classroom Environment on Student Learning, Educational Resources Information Center, ED 010 252, University of California, Davis Campus, 1965. (2, 17, 34)

"Classroom Ecology," Journal of Applied Behavioral Science 3:489-503, October-November-December, 1967. (19)

Tight Spaces: Hard Architecture and How to Humanize It, Prentice-Hall, Englewood Cliffs, N.J., 1974, 150 pp. (2)

"Classroom Layout," Theory Into Practice 16:174-175, June, 1977. (1, 30)

Sommer, Robert, and Becker, Franklin D., "Room Density and User Satisfaction," Environment and Behavior 3:412-417, December, 1971. (26)

Sommer, Robert, and Olsen, Helge, "The Soft Classroom," Environment and Behavior 12:3-16, March, 1980. (23)

Stires, Lloyd, "The Effect of Classroom Seating Location on Student Grades and Attitudes: Environment or Self-Selection?" Environment and Behavior 12:241-254, June, 1980. (17, 34)

Sullivan, Janet, "Nine Design Factors for Better Learning," Instructional Innovator 26:14-16, March, 1981. (10)

Tognoli, J., "The Effects of Windowless Rooms and Unembellished Surroundings on Attitudes and Retention," Environment and Behavior 5:191-201, June, 1973. (24, 35)

Walberg, Herbert J., and Haertel, Geneva D., "Validity and Use of Educational Environment Assessments," Studies in Educational Evaluation 6:225-238, 1980. (25)

Webster's New World Dictionary of the American Language, World Publishing Company, Cleveland and New York, 1962, 1724 pp. (7)

Weinstein, Carol S., "Modifying Student Behavior in an Open Classroom Through Changes in the Physical Design," American Educational Research Journal 14:249-262, Summer, 1977. (19)

"The Physical Environment of the School: A Review of the Research," Review of Educational Research 49:577-610, Fall, 1979. (2, 8, 33)

"Planning the Classroom Environment: Some Guidelines for Teachers," Humanist Educator 18:186-193, June, 1980. (2, 11, 33)

"Classroom Design as an External Condition for Learning," Educational Technology 21:12-19, August, 1981. (1, 2, 9)

Weinstein, Carol S., and Woolfolk, Anita E., "Classroom Design and Impression Formation: A New Area for Research," Contemporary Educational Psychology 6:383-386, October, 1981. (27)

Woolfolk, Anita, and Nicolich, Lorraine McCune, Educational Psychology for Teachers, Prentice-Hall, Englewood Cliffs, N.J., 1980, 622 pp. (3)

Zifferblatt, Steven M., "Architecture and Human Behavior: Toward Increasing Understanding of a Functional Relationship," Educational Technology 12:54-57, August, 1972. (20, 34)